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Carex × *takoensis* Endo et Yashiro (Cyperaceae), a New Hybrid from Chiba Prefecture, Central Japan

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A population of presumed hybrid origin between *Carex lasiocarpa* Ehrhart var. *occultans* (Franch.) Kükenth. and *C. rugulosa* Kükenth. was found in Chiba Prefecture, and the hybrid was named *C.* × *takoensis* Endo et Yashiro. It has pubescent utricles which are characteristic in *C. lasiocarpa* var. *occultans* and abaxially verrucose leaf surface characteristic in *C. rugulosa*. Leaves of the hybrids are intermediate in size between them. Pollen viability of the hybrid is distinctly lower than those of the presumed parental species.

In the moorland located on the boundary between the towns Tako-machi and Hikari-machi, Chiba Prefecture, central Japan, one of us (Yashiro) found several plants similar to *Carex lasiocarpa* var. *occultans* in having pubescent utricles, but different in having wider leaves. Whether these plants belong to a new species, or a new variety of *C. lasiocarpa*, or a new hybrid between *C. lasiocarpa* var. *occultans* and its related species was unsettled (Iwase et al. 1993).

According to T. Koyama (1962), *Carex lasiocarpa* var. *occultans* is included in the section Paludosae Fries. This section also includes our specimens, *C. rugulosa* and *C. vesicaria*, which are observed in the moorland (Iwase et al. 1993). To identify our specimens, we examined them and those related species living in the moorland on the following characteristics: (1), surface structure of the abaxial side of utricles and leaves; (2), mouth shape of leaf sheaths; (3), transverse section of utricle walls; (4), leaf width; and (5), pollen viability. Morphological observations were performed with dissecting microscopes and SEM (Hitachi S-800). For the observations with SEM, fixed materials with FAA were dehydrated in an ethanol series, critical-point dried, then sputter-coated with platinum palladium (Pt-Pd). To observe the transverse section, utricles were cut in the middle parts with razors before critical-point drying. Leaf width was measured at the widest part of leaves in each herbarium specimen. Pollen viability was estimated with the stainability of pollen grains with the anilineblue lactophenol method (Hauser and Morrison 1964). Pollen stainability was measured with the ratio of the number of stained grains to the total number of pollen with over 1000 grains from flowers of one inflorescence in our study. Examined specimens are listed at the end of this paper and are preserved in the Herbarium of the Natural History Museum and Institute, Chiba (CBM).

Abaxial surfaces of utricles are pubescent (Figs. 1A, 1B), sparsely pubescent (Figs. 1C, 1D) or glabrous (Fig. 1E). Abaxial surfaces of leaves are verrucose (Figs. 2A, 2B), sparsely verrucose (Figs. 2C, 2D) or smooth (Figs. 2E, 2F). Mouth shape of leaf sheaths is circular (Fig. 3A) or triangular (Fig. 3B). Walls of utricles are thick (about 6–10 cell layers) (Fig. 4A) or thin (about 4 cell layers) (Fig. 4B). Width of leaves examined varies from 0.19 cm to 1.00 cm. Average width is 0.46 cm. Results of morphological observations are summarized in Table 1.

Pollen grains are divided into two types; stained (Fig. 5Aa), and not stained but shrunken (Fig. 5Ab).

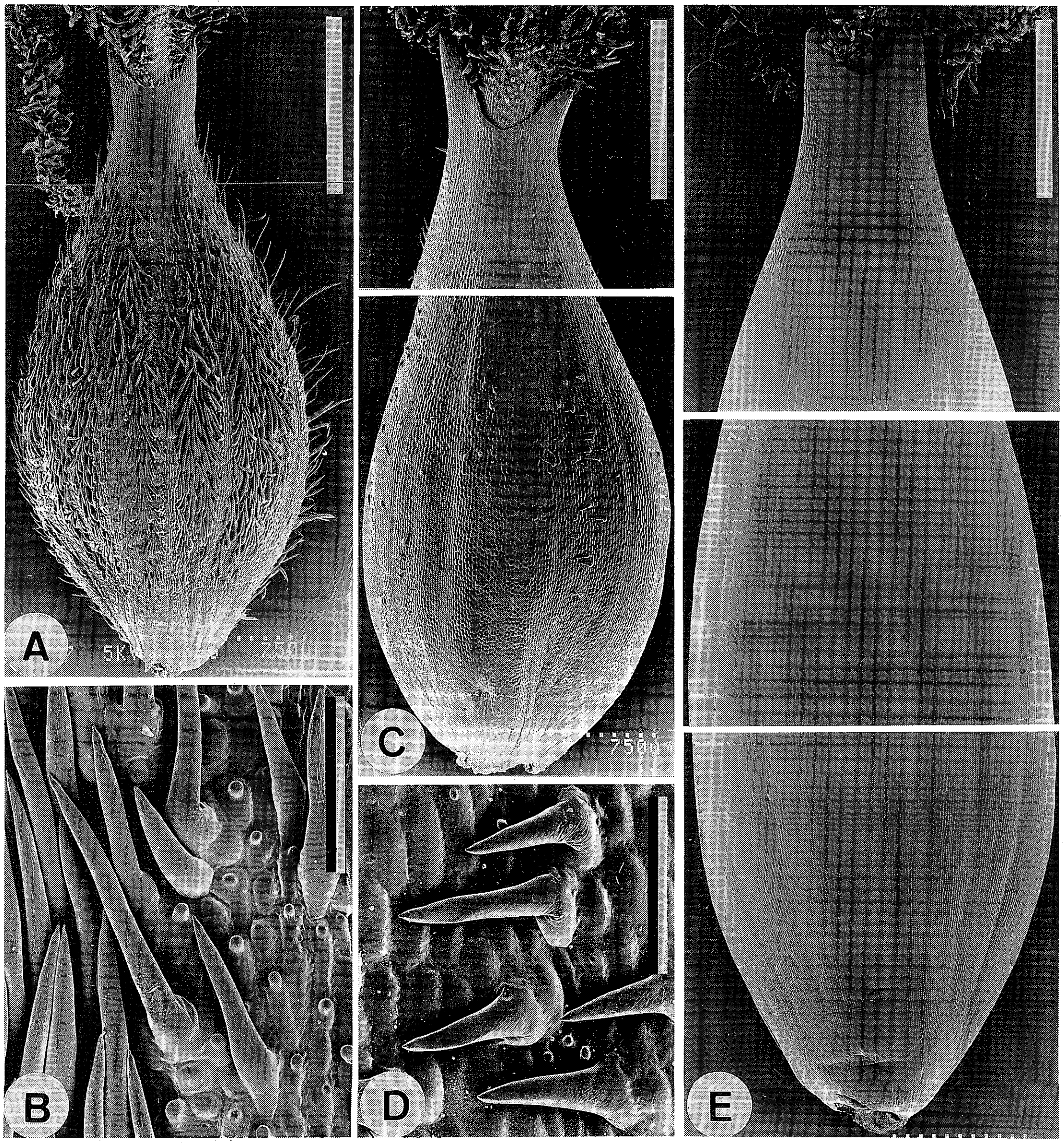

Fig. 1. Abaxial surfaces and hairs of utricles of three *Carex* species. A, B. *C. lasiocarpa* var. *occultans* (Y. Endo 2943). C, D. *C.* × *takoensis* (Y. Endo 2949). E. *C. rugulosa* (Y. Endo 2945). Scale bars = 1mm in A, C, E; and 0.1mm in B, D.

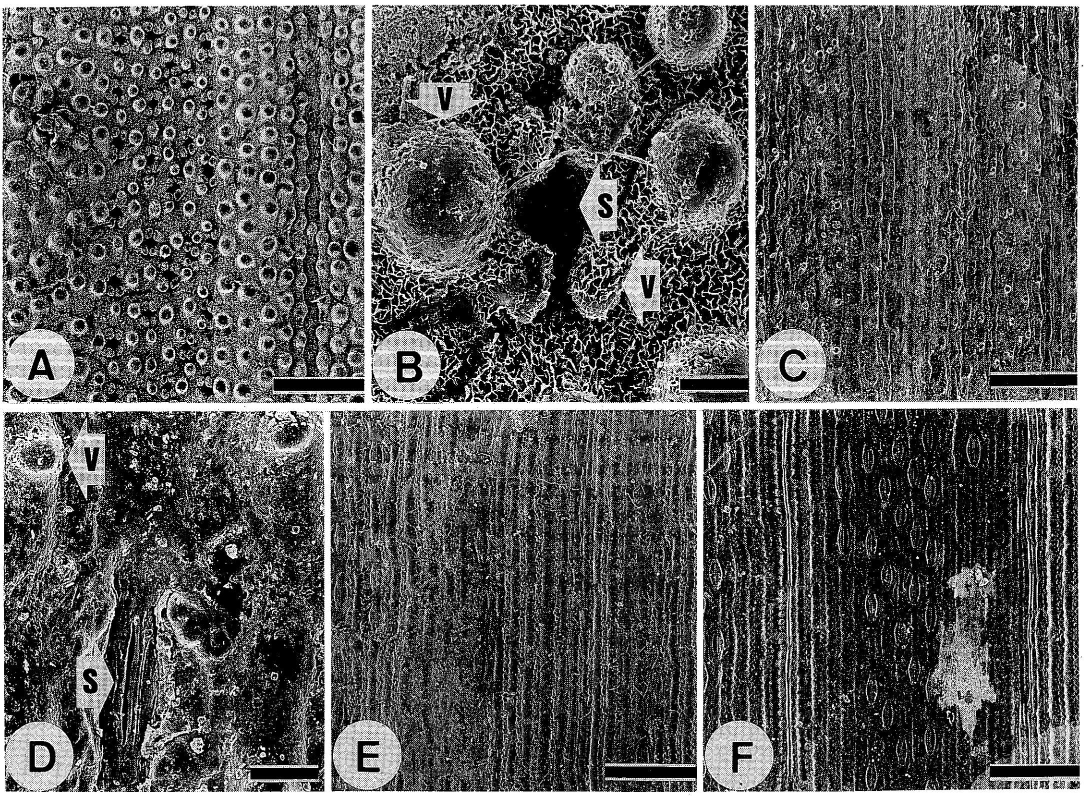

Fig. 2. Abaxial surfaces of leaves of four *Carex* species. A, B. *C. rugulosa* (Y. Endo 2964). C, D. *C.* × *takoensis* (Y. Endo 2963). E. *C. lasiocarpa* var. *occultans* (Y. Endo 2961). F. *C. vesicaria* (Y. Endo 2962). s: stoma. v: verrucous projection. Scale bars = 0.1mm in A, C, E, F; and 0.01mm in B, D.

The specimens whose pollen stainability was estimated are listed in Table 2.

Our specimens are similar to *Carex lasiocarpa* var. *occultans* and *C. rugulosa* with thick walled utricles and circular mouths of leaf sheaths, but are different from *C. vesicaria* in having thin walled utricles and triangular mouths of leaf sheaths. Our specimens, also have same features of *C. lasiocarpa* var. *occultans* and *C. rugulosa*, i.e., pubescent utricles as in *C. lasiocarpa* var. *occultans* and abaxially verrucose leaf surfaces as in *C. rugulosa*. The leaf width of our specimens is intermediate between *C. lasiocarpa* var. *occultans* and *C. rugulosa* (Table 1). Pollen viability of our specimens is considered from the calculations of pollen stainability in the representative specimens to be low (Table 2). We therefore concluded that our specimens are of putative hybrid origin between *C. lasiocarpa* var. *occultans* and *C. rugulosa*, and that they are named *C.* × *takoensis*.

We wish to thank Dr. T. Ohba of The Natural History Museum and Institute, Chiba for his useful advice. We are grateful to Prof. H. Ohashi of Tohoku University for his critical reading of the manuscript. This study was carried out as a part of the project entitled "Investigation into the Natural History of the Boso Peninsula" by the Natural History Museum and Institute, Chiba.

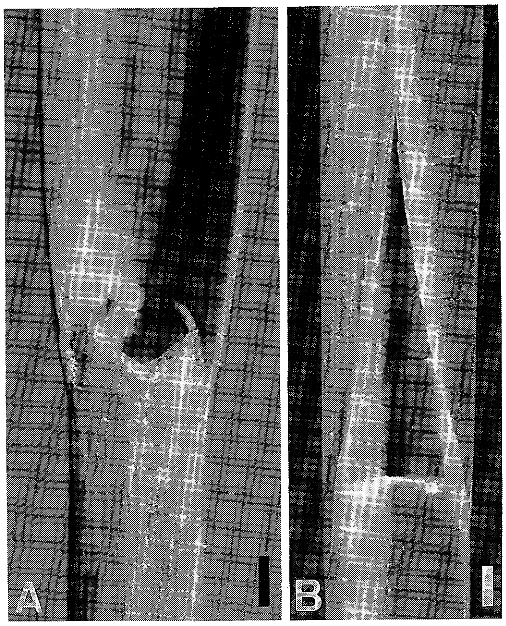

Fig. 3. Mouth shape of leaf sheaths of two *Carex* species. A. *C.* × *takoensis* (Y. Endo 2963). B. *C. vesicaria* (Y. Endo 2962). Scale bars = 1mm.

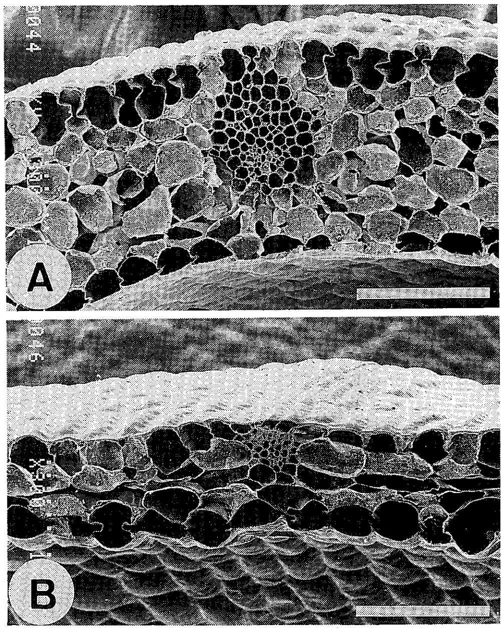

Fig. 4. Transverse sections of utricle walls of two *Carex* species. A. *C.* × *takoensis* (Y. Endo 2949). B. *C. vesicaria* (Y. Endo 2954). Scale bars = 0.1mm.

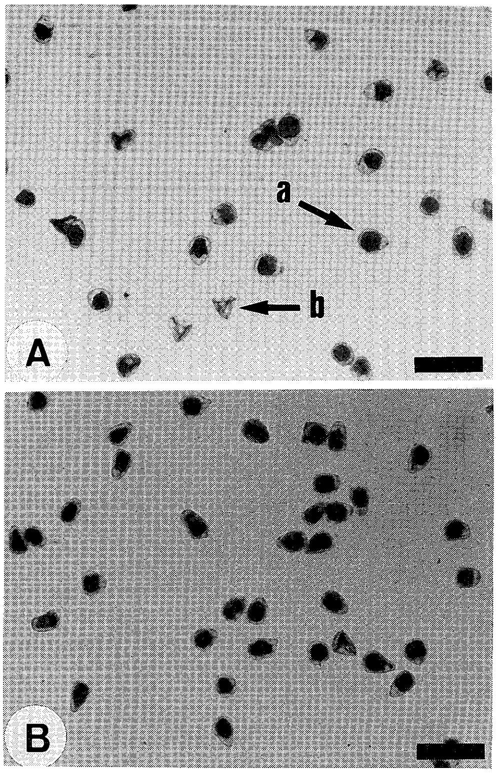

Fig. 5. Pollen grains stained with anilineblue lactophenol solution of two *Carex* species. A. *C.* × *takoensis* (Y. Endo 2937). B. *C. lasiocarpa* var. *occultans* (Y. Endo 2938). a: a stained pollen grain. b: a non-stained and shrunken pollen grain. Scale bars = 0.1mm.

Taxonomic treatment

Carex × takoensis Endo et Yashiro, **hybr. nov.** (Fig. 6)

Carex lasiocarpa Ehrhart var. *occultans* (Franch.) Kükenth. × *C. rugulosa* Kükenth.

Planta inter *Carex lasiocarpa* Ehrhart var. *occultans* (Franch.) Kükenth. et *C. rugulosa* Kükenth. quasi intermedia, perennis, stolonifer. Ab *C. lasiocarpa* var. *occultans* foliis infra verrucosis differt (quad cum *C. rugulosa*), ab *C. rugulosa* utriculis pubescentibus differt (quad cum *C. lasiocarpa* var. *occultans*). Folia 0.3 cm–0.5 cm lata, inter *C. lasiocarpa* var. *occultans* et *C. rugulosa* media.

Hab. Japan, Chiba Pref., in the moorland located

Table 1. Comparison among *Carex lasiocarpa* var. *occultans, C. rugulosa, C.* × *takoensis* and *C. vesicaria*

Characters	*C. lasiocarpa* var. *occultans*	*C. rugulosa*	*C.* × *takoensis*	*C. vesicaria*
Utricle surface	pubescent	glabrous	sparsely pubescent	glabrous
Utricle wall thickness	thick	thick	thick	thin
Leaf abaxial surface texture	smooth	verrucose	a little verrucose	smooth
Leaf sheath mouth shape	circular	circular	circular	triangular
Leaf width (cm)				
Range	0.19–0.28	0.54–1.00	0.29–0.52	0.35–0.57
Mean value ± standard deviation	0.24±0.03	0.71±0.12	0.36±0.06	0.45±0.08

Table 2. Pollen stainability of *Carex lasiocarpa* var. *occultans, C. rugulosa, C.* × *takoensis* and *C. vesicaria*

Species	Specimens examined	Pollen stainability (%)
C. lasiocarpa var. *occultans*	Y. Endo 2938	92
C. rugulosa	K. Yashiro & Y. Endo 2855	93
	K. Yashiro & Y. Endo 2856	99
	K. Yashiro & Y. Endo 2956	97
C. × *takoensis*	K. Yashiro & Y. Endo 2959	34
	Y. Endo 2937	50
C. vesicaria	K. Yashiro & Y. Endo 2861	72
	K. Yashiro & Y. Endo 2957	94

on the boundary between the towns Tako-machi and Hikari-machi. K. Yashiro & Y. Endo 2860, 1993 May 8 (fl.) in CBM, holotypus (Fig. 6).

Nom. Jap. Mujinakugu.

Specimens examined

All of the specimens were collected from the moorland located on the boundary between the towns Tako-machi and Hikari-machi, Chiba Pref., Japan.

Carex × *takoensis*: K. Yashiro (CBM 41114), 1990 Apr. 30. K. Yashiro and Y. Endo 2848, 2849, 2851, 2852, 1993 Apr. 30; 2859, 2860, 2958, 2959, 1993 May 8. Y. Endo 2937, 1994 May 1; 2946, 2947, 2948, 2949, 2950, 2951, 2952, 1994 June 2; 2963, 1994 Jul. 6.

Carex lasiocarpa var. *occultans*: K. Yashiro (CBM 29209) 1989 Apr. 16; (CBM 30328, 41112) 1990 Apr. 30; (CBM 49503) 1992 Apr. 26. K. Yashiro et al. (CBM 44410) 1990 May 6. Y. Endo 2938, 1994 May 1; 2941, 2942, 2943, 1994 June 2; 2961, 1994 July 6.

Carex rugulosa: K. Yashiro (CBM 29879), 1989 Apr. 23; (CBM 49505, 49507), 1992 Apr. 26. K. Yashiro and Y. Endo 2855, 2856, 2857, 2858, 2956, 1993 Apr. 30. K. Yashiro et al. (CBM 44411, 44412), 1990 May 6. Y. Endo 2939, 2940, 1994 May 1; 2944, 2945, 1994 June 2; 2964, 1994 Jul. 6.

Carex vesicaria: K. Yashiro (CBM 30261), 1988 Apr. 29; (CBM 41404) 1989 Mar. 29; (CBM 30260), 1989 Apr. 16; (CBM 41111), 1990 Apr. 30; (CBM 49511, 49512) 1992 Apr. 26. K. Yashiro and Y. Endo 2853, 2854, 1993 Apr. 30; 2861,

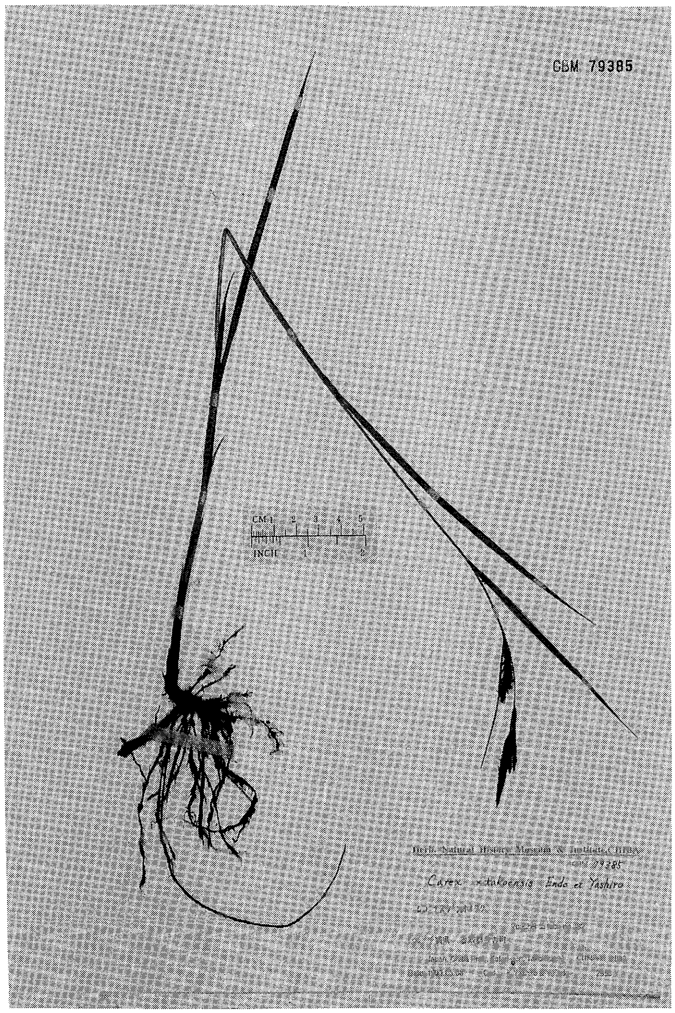

Fig. 6. Holotype specimen of *Carex* × *takoensis* (K. Yashiro & Y. Endo 2860).

2957, 1993 May 8. K. Yashiro et al. (CBM 44407, 44408), 1990 May 6. Y. Endo 2953, 2954, 2955, 1994 June 2; 2962, 1994 Jul. 6.

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遠藤泰彦，谷城勝弘：**ムジナスゲとオオクグの雑種**

千葉県香取郡多古町と匝瑳郡光町にまたがる湿原において，ムジナスゲとオオクグの雑種と推定される集団を発見した．ムジナスゲは果胞が有毛であり，また，オオクグは葉の裏面がいぼ状の突起で被われることでそれぞれ特徴づけられる．これに対し，雑種個体では果胞に毛があり，また，

葉の裏面にはいぼ状の突起があり，ムジナスゲとオオクグの特徴を同時に持っている．葉の幅はムジナスゲとオオクグの中間長となり，花粉の染色性はこれらに比べ低い．この推定雑種は，地下茎をのばしており，栄養繁殖をしていると考えられる．これをムジナクグ *Carex* × *takoensis* Endo et Yashiro と命名した．